

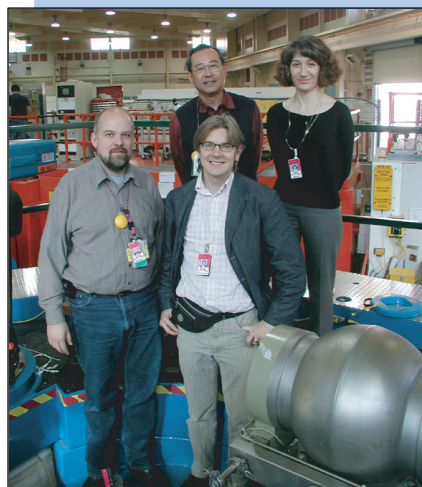
Neutron Powder Diffractometer (NPDF)

The Neutron Powder Diffractometer (NPDF) is a high-resolution total-scattering powder diffractometer located at Flight Path 1, 32 meters from the spallation neutron target. It comprises 20 detector panels with a total of 160 position-sensitive detectors in the backscattering region of the instrument. NPDF is designed for pair distribution function (PDF) studies of disordered and nano-crystalline materials, but it is equally well-suited for high-resolution crystallographic studies. The instrument is available to general users.

On September 27, 2002, the shutter of NPDF opened for the first time. During the rest of the 2002 run cycle, NPDF produced over 300 experimental data sets. An example of a PDF of nickel extending out to a distance of $r = 100 \text{ \AA}$ is shown below. (A standard data set suitable for PDF analysis can be obtained in only two hours.) These promising results put NPDF at the cutting edge of local structure determination and also serve as a development platform for this new structure analysis tool for disordered and nano-structured materials.

The NPDF project was funded by the National Science Foundation; University of Pennsylvania; Michigan State University; University of California at Santa Barbara; University of Virginia; and State University of New York at Stony Brook, as well as Los Alamos National Laboratory.

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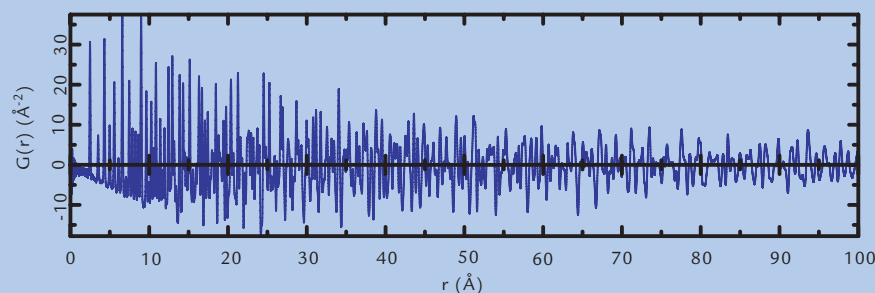


*Pictured are some of the sponsors of NPDF:
Top row, left to right: Takeshi Egami, University of Pennsylvania, and Despina Louca, University of Virginia*

Bottom row, left to right: Thomas Proffen, LANSCE-12, and Simon Billinge, Michigan State University

Not shown are John Parise, State University of New York at Stony Brook, and Tony Cheetham, University of California at Santa Barbara

General Information			
Moderator	chilled water (283 K)		
Flight path	primary: 32 m, secondary: 1.5 m		
Beam size	5 cm high x 1 cm wide		
Detector Bank Information			
Bank	±90	±119	±148
d-spacing	0.17 - 42 Å	0.14 - 3.4 Å	0.12 - 3.0 Å
Q	1.5 - 37.6 Å ⁻¹	1.8 - 45.8 Å ⁻¹	2.1 - 51.1 Å ⁻¹
Measured Δd/d	0.31%	0.28%	0.15%
Detector type	124 ³ He tubes	80 ³ He PSDs	80 ³ He PSDs
Pixels	124	4000	4000
Pixel size (w x h)	0.5" x 12"	0.5" x 1.0"	0.5" x 1.0"
Ancillary Equipment			
Displex	15 - 320 K (closed cycle refrigerator)		
Cryofurnace	15 - 800 K		
Other	special furnaces, xyz translation table cryostat contact instrument scientist		



PDF of nickel extending out to a distance of $r = 100 \text{ \AA}$



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